

IN THE CLAIMS

Claims 1, 3-9, 11, 24, 28, 32 and 34-40 are pending. In this amendment, claims 3, 9, 32, 40 and 41 are amended. Claims 42-48 are added. The status of all claims is provided below.

1. (original) A catalytic system comprising a tethered catalyst composition or a tethered chiral auxiliary disposed in a microchannel.

2. (canceled)

3. (currently amended) The catalytic system of claim 1 wherein the system comprises a tethered catalyst composition, and the tethered catalyst composition ~~defines~~ is attached to at least one wall that defines ~~of~~ a bulk flow path in the microchannel.

4. (original) The catalytic system of claim 3, wherein at least one heat transfer microchannel is adjacent to at least one wall of the microchannel.

5. (original) The catalytic system of claim 1 wherein said tethered catalyst composition or tethered chiral auxiliary is provided as, or part of, a porous insert.

6. (currently amended) The catalytic system of claim 5, wherein said porous insert is adjacent to at least one wall of the microchannel, and at least one heat transfer microchannel is adjacent to said at least one wall of a microchannel.

7. (original) The catalytic system of claim 1, wherein said tethered catalyst composition or tethered chiral auxiliary comprises a solid support selected from the group consisting of: solid inorganic oxide, carbon, polymer, silica, alumina, clay, zeolite and mesoporous solid.

8. (original) The catalytic system of claim 1, wherein the system comprises a tethered catalyst composition in which a tether comprises at least a three atom chain that connects a metal center with a surface oxygen.

9. (currently amended) The catalytic system of claim 8, wherein the tethered catalyst composition comprises one or more member selected from the group consisting of a metal, a metal coordination complex, an organometallic complex, an oxidant, a reductant, an acid, and a base.

10. (canceled)

11. (original) The system of claim 1 further comprising a micromixer positioned to mix reactants prior to passage into the microchannel.

12-23. (canceled)

24. (original) The catalytic system of claim 1 wherein the microchannel comprises at least one wall and a tethered catalyst or a tethered chiral auxiliary is coated on the wall of the microchannel.

25-27. (canceled)

28. (original) The system of claim 1 wherein the microchannel comprises a chiral auxiliary.

29-31. (canceled)

32. (currently amended) The catalytic system of claim 1, wherein the system comprises a tethered catalyst composition ~~comprises~~ comprising a dendritic catalyst.

33. (canceled)
34. (previously presented) The catalytic system of claim 1 wherein the microchannel comprises a minimum dimension of greater than 1 μm and a length greater than 1 cm.
35. (previously presented) The catalytic system of claim 34, comprising at least one heat transfer microchannel that is adjacent to at least one wall of the microchannel.
36. (previously presented) The catalytic system of claim 35 wherein the at least one wall of the microchannel is comprised of an iron based alloy.
36. (previously presented) The catalytic system of claim 34 comprising at least 10 of the microchannels that comprise a tethered catalyst composition or a tethered chiral auxiliary disposed in the microchannel.
- ~~37.~~ 41. (currently amended) The catalytic system of claim 35 comprising at least 3 arrays of planar microchannels that comprise a tethered catalyst composition or a tethered chiral auxiliary disposed in the microchannel.
38. (previously presented) The catalytic system of claim 34 comprising at least 10 layers of heat exchangers interleaved with at least 10 layers comprising the microchannels that comprise a tethered catalyst composition or a tethered chiral auxiliary disposed in the microchannel.
39. (previously presented) The catalytic system of claim 34 comprising a bridging oxo group connecting a transition metal center of a tethered catalyst with a surface metal or semimetal.
40. (currently amended) The catalytic system of claim 1 wherein said tethered catalyst

composition is made from an organometallic compound comprising $\text{Ni}[\text{P}(\text{OMe})_3]_4$, $\text{RhCl}_3(\text{SR}_2)_3$, $\text{NiCl}_2(\text{PEt}_3)_2$, $\text{RhH}(\text{CO})(\text{PPh}_3)_3$, $\text{RhCl}(\text{CO})(\text{PPh}_3)_2$, or $\text{IrCl}(\text{CO})(\text{PPh}_3)_2$.

42. (new) The catalytic system of claim 3 comprising a 0.1 to 1.0 mm gap for bulk flow.
43. (new) The catalytic system of claim 1 wherein the system comprises a tethered catalyst composition made by reacting $\text{Cl-CH}_2\text{-CH}_2\text{-CH}_2\text{-SiH}_3$, $\text{Cl-CH}_2\text{-CH}_2\text{-CH}_2\text{-Si}(\text{OCH}_3)_3$, or $\text{Cl-CH}_2\text{-CH}_2\text{-CH}_2\text{-NH}_2$ with a support surface.
44. (new) The catalytic system of claim 1 wherein the system comprises a tethered catalyst composition made by reacting a tether that is between 2 and 9 atoms long with a support surface and the resulting modified surface reacted with a metal complex or complexes.
45. (new) The catalytic system of claim 1 wherein the system comprises a tethered catalyst composition made by reacting a metal complex with a tether that is subsequently reacted with an inorganic support.
46. (new) The catalytic system of claim 1 wherein the system comprises a tethered catalyst composition comprising a tethered metallocene.
47. (new) The catalytic system of claim 1 wherein the system comprises a tethered catalyst composition comprising a Schiff base palladium catalyst.
48. (new) The catalytic system of claim 47 wherein a surface is modified with an aminopropyl tether.